

- 1 Mr Chan flies from London to Los Angeles, a distance of 8800 km.
The flight takes 11 hours and 10 minutes.

- (a) (i) His plane leaves London at 09 35 local time.
The local time in Los Angeles is 8 hours behind the time in London.

Calculate the local time when the plane arrives in Los Angeles.

..... [2]

- (ii) Work out the average speed of the plane in km/h.

..... km/h [2]

- (b) There are three types of tickets, economy, business and first class.
The price of these tickets is in the ratio economy : business : first class = 2 : 5 : 9.

- (i) The price of a business ticket is \$2350.

Calculate the price of a first class ticket.

\$..... [2]

- (ii) Work out the price of an economy ticket as a percentage of the price of a first class ticket.

.....% [1]

- (c) The price of a business ticket for the same journey with another airline is \$2240.

- (i) The price of a first class ticket is 70% more than a business ticket.

Calculate the price of this first class ticket.

\$..... [2]

- (ii) The price of a business ticket is 180% **more** than an economy ticket.

Calculate the price of this economy ticket.

\$..... [3]

- (d) Mr Chan hires a car in Los Angeles.
The charges are shown below.

<u>Car Hire</u>
\$28.00 per day plus \$6.50 per day insurance.
\$1.25 for every kilometre travelled after the first 800 km. The first 800 km are included in the price.

Mr Chan hired the car for 12 days and paid \$826.50 .

- (i) Find the number of kilometres Mr Chan travelled in this car.

..... km [4]

- (ii) The car used fuel at an average rate of 1 litre for every 10 km travelled.
Fuel costs \$1.30 per litre.

Calculate the cost of the fuel used by the car during the 12 days.

\$..... [2]

2 (a) Work out the value of x in each of the following.

(i) $3^x = 243$

$x = \dots\dots\dots$ [1]

(ii) $16^x = 4$

$x = \dots\dots\dots$ [1]

(iii) $8^x = 32$

$x = \dots\dots\dots$ [2]

(iv) $27^x = \frac{1}{9}$

$x = \dots\dots\dots$ [2]

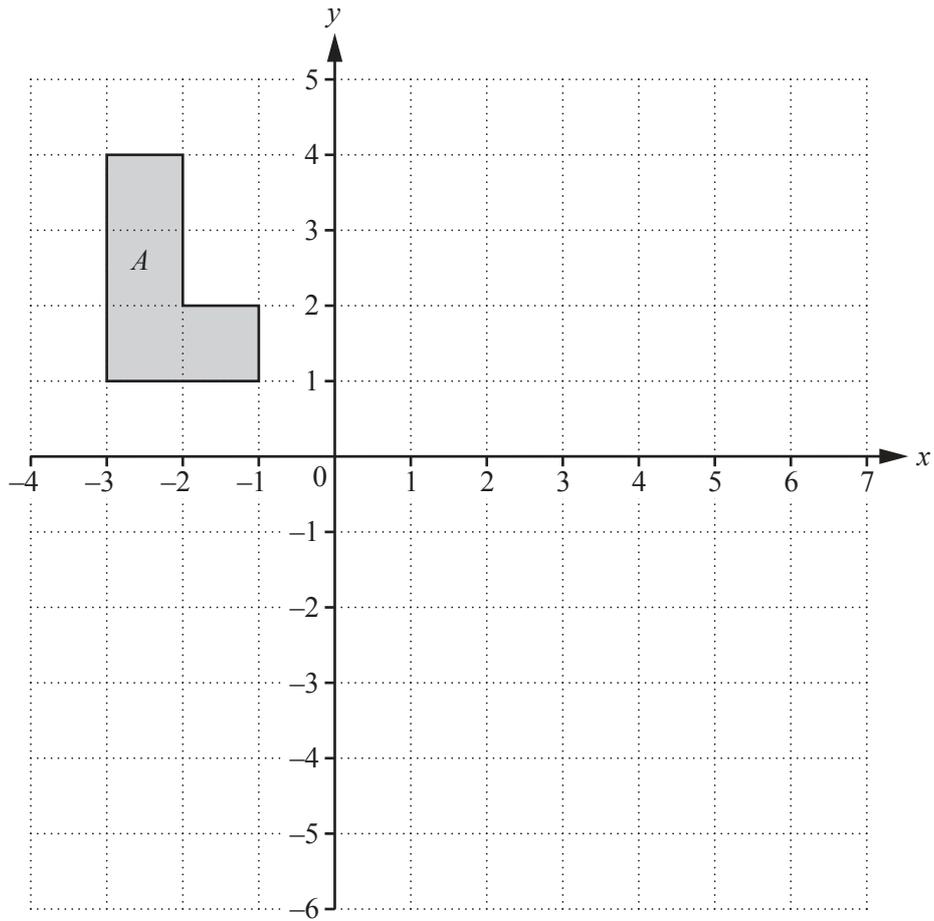
(b) Solve by factorisation.

$$y^2 - 7y - 30 = 0$$

Show your working.

$y = \dots\dots\dots$ or $y = \dots\dots\dots$ [3]

3 (a)



On the grid, draw the image of

(i) shape A after a reflection in the line $x = 1$, [2]

(ii) shape A after an enlargement with scale factor -2 , centre $(0, 1)$, [2]

(iii) shape A after the transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. [3]

(b) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$.

.....

..... [3]

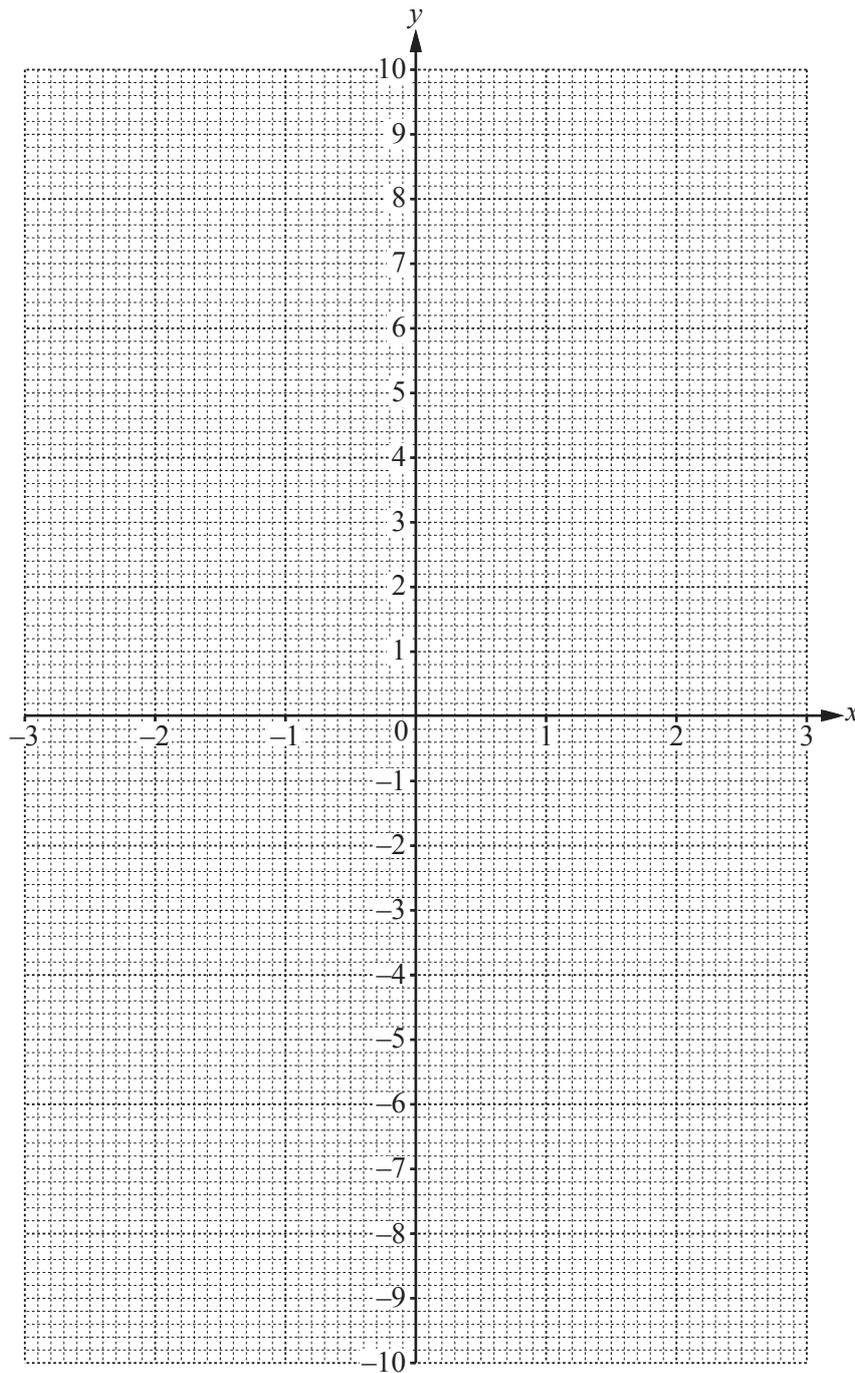
4 $f(x) = x^2 - \frac{1}{x} - 4, x \neq 0$

(a) (i) Complete the table.

x	-3	-2	-1	-0.5	-0.1		0.2	0.5	1	2	3
$f(x)$	5.3	0.5		-1.8	6.0		-9.0	-5.8	-4		4.7

[2]

(ii) On the grid, draw the graph of $y = f(x)$ for $-3 \leq x \leq -0.1$ and $0.2 \leq x \leq 3$.



[5]

(b) Use your graph to solve the equation $f(x) = 0$.

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots \text{ or } x = \dots\dots\dots [3]$$

(c) Find an integer k , for which $f(x) = k$ has one solution.

$$k = \dots\dots\dots [1]$$

(d) (i) By drawing a suitable straight line, solve the equation $f(x) + 2 = -5x$.

$$x = \dots\dots\dots \text{ or } x = \dots\dots\dots [4]$$

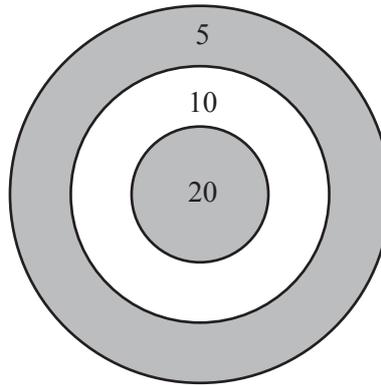
(ii) $f(x) + 2 = -5x$ can be written as $x^3 + ax^2 + bx - 1 = 0$.

Find the value of a and the value of b .

$$a = \dots\dots\dots$$

$$b = \dots\dots\dots [2]$$

- 5 Kiah plays a game.
The game involves throwing a coin onto a circular board.
Points are scored for where the coin lands on the board.



If the coin lands on part of a line or misses the board then 0 points are scored.
The table shows the probabilities of Kiah scoring points on the board with one throw.

Points scored	20	10	5	0
Probability	x	0.2	0.3	0.45

- (a) Find the value of x .

$$x = \dots\dots\dots [2]$$

- (b) Kiah throws a coin fifty times.

Work out the expected number of times she scores 5 points.

$$\dots\dots\dots [1]$$

- (c) Kiah throws a coin two times.

Calculate the probability that

- (i) she scores either 5 or 0 with her first throw,

$$\dots\dots\dots [2]$$

- (ii) she scores 0 with her first throw and 5 with her second throw,

$$\dots\dots\dots [2]$$

(iii) she scores a total of 15 points with her two throws.

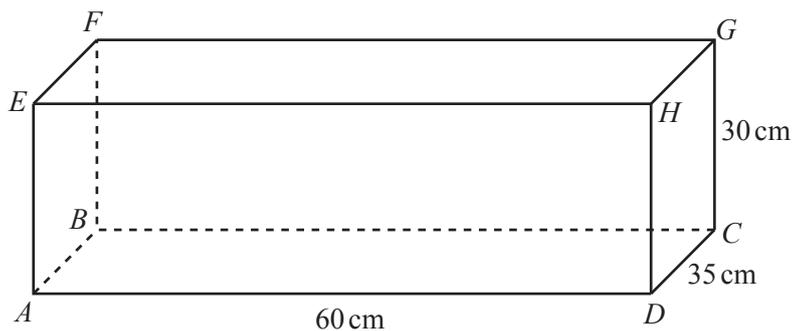
..... [3]

(d) Kiah throws a coin three times.

Calculate the probability that she scores a total of 10 points with her three throws.

..... [5]

6 The diagram shows a cuboid.



NOT TO SCALE

$AD = 60\text{ cm}$, $CD = 35\text{ cm}$ and $CG = 30\text{ cm}$.

(a) Write down the number of planes of symmetry of this cuboid.

..... [1]

(b) (i) Work out the surface area of the cuboid.

..... cm^2 [3]

(ii) Write your answer to **part (b)(i)** in square metres.

..... m^2 [1]

(c) Calculate

(i) the length AG ,

$AG =$ cm [4]

(ii) the angle between AG and the base $ABCD$.

..... [3]

(d) (i) Show that the volume of the cuboid is $63\,000\text{ cm}^3$.

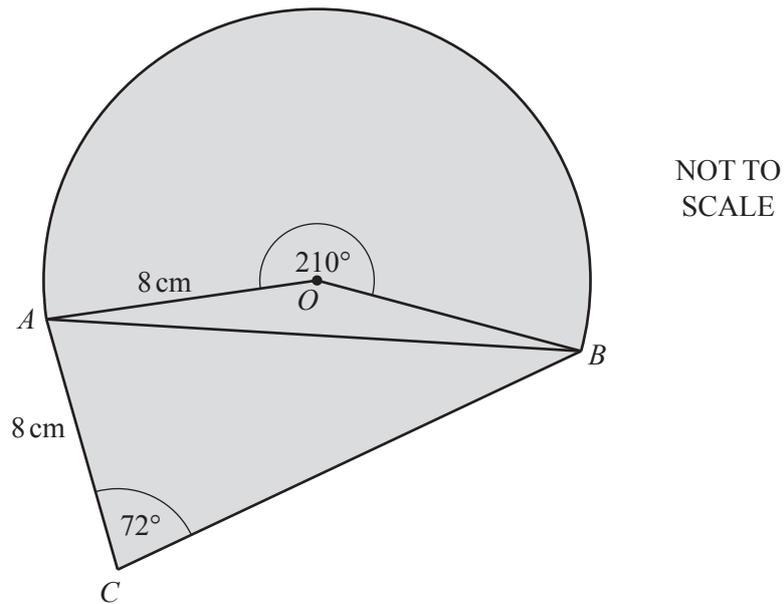
[1]

(ii) A cylinder of height 40 cm has the same volume as the cuboid.

Calculate the radius of the cylinder.

..... cm [3]

7



The diagram shows a design for a logo made from a sector and two triangles. The sector, centre O , has radius 8 cm and sector angle 210° . $AC = 8$ cm and angle $ACB = 72^\circ$.

(a) Show that angle $OAB = 15^\circ$.

[2]

(b) Calculate the length of the straight line AB .

$AB = \dots\dots\dots$ cm [4]

(c) Calculate angle ABC .

Angle $ABC = \dots\dots\dots$ [3]

(d) Calculate the total area of the logo design.

$\dots\dots\dots\text{cm}^2$ [6]

(e) The logo design is an enlargement with scale factor 4 of the actual logo.

Calculate the area of the actual logo.

$\dots\dots\dots\text{cm}^2$ [2]

8 $f(x) = 5x + 7$ $g(x) = \frac{4}{x-3}, x \neq 3$

(a) Find

(i) $fg(1)$,

..... [2]

(ii) $gf(x)$,

..... [2]

(iii) $g^{-1}(x)$,

$g^{-1}(x) =$ [3]

(iv) $f^{-1}f(2)$.

..... [1]

(b) $f(x) = g(x)$

(i) Show that $5x^2 - 8x - 25 = 0$.

[3]

(ii) Solve $5x^2 - 8x - 25 = 0$.

Show all your working and give your answers correct to 2 decimal places.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [4]

Question 9 is printed on the next page.

9 A line joins the points $A (-2, -5)$ and $B (4, 13)$.

(a) Calculate the length AB .

$AB = \dots\dots\dots [3]$

(b) Find the equation of the line through A and B .
Give your answer in the form $y = mx + c$.

$y = \dots\dots\dots [3]$

(c) Another line is parallel to AB and passes through the point $(0, -5)$.

Write down the equation of this line.

$\dots\dots\dots [2]$

(d) Find the equation of the perpendicular bisector of AB .

$\dots\dots\dots [5]$

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